PB-239 591

ROCK LAKE, JEFFERSON COUNTY, WISCONSIN

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
Wisconsin Department of Natural Resources
Wisconsin National Guard

October 1974

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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Report

on

Rock Lake

Jefferson County

Wisconsin

EPA Region V

Working Paper No. 46

With the cooperation of the

Wisconsin Department of Natural Resources

and the

Wisconsin National Guard

October, 1974

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Wisconsin Department of Natural Resources for professional involvement and to the Wisconsin National Guard for conduct of the tributary sampling phase of the Survey.

Francis H. Schraufnagel, Acting Assistant Director, and Joseph R. Ball of the Bureau of Water Quality, and Donald R. Winter, Lake Rehabilitation Program, provided invaluable lake documentation and counsel during the Survey. Central Office and District Office personnel of the Department of Natural Resources reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

Major General James J. Lison, Jr., the Adjutant General of Wisconsin, and Project Officer CW-4 Donald D. Erickson, who directed the volunteer efforts of the Wisconsin National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

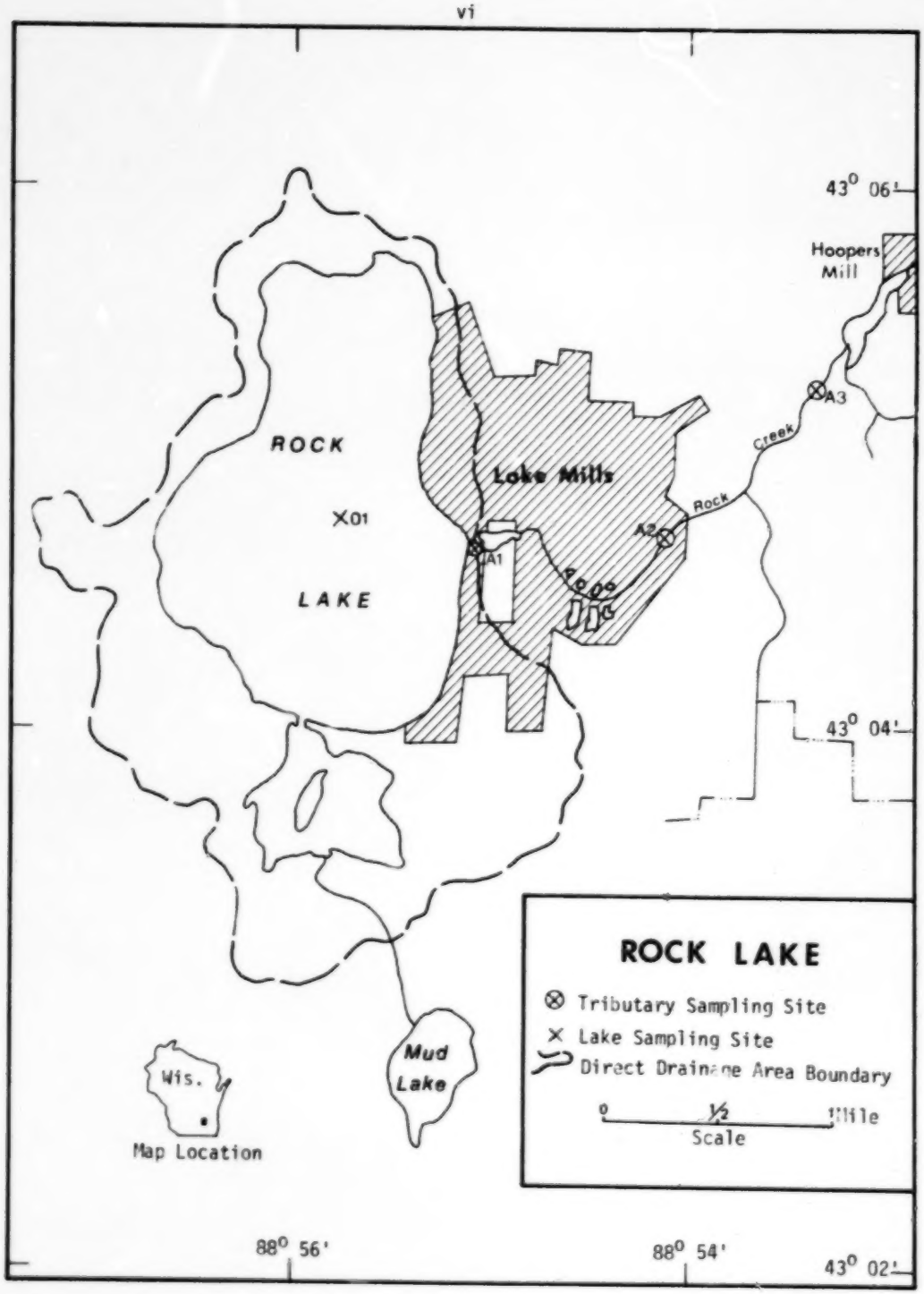
NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF WISCONSIN

LAKE NAME	COUNTY
Altoona	Eau Claire
Beaver Dam	Barron
Beaver Dam	Dodge
Big Eau Pleine	Marathon
Browns	Racine
Butte des Morts	Winnebago
Butternut	Price, Ashland
Castle Rock Flowage	Juneau
Como	Walworth
Crystal	Vilas
Delavan	Walworth
Eau Claire	Eau Claire
Elk	Price
Geneva	Walworth
Grand	Green Lake
Green	Green Lake
Kegonsa	Dane
Koshkonong	Jefferson, Rock, Dane
Lac La Belle	Waukesha
Long	Price
Middle	Walworth
Nagawicka	Waukesha
Oconomowoc	Waukesha
Okauchee	Waukesha
Petenwell Flowage	Juneau
Pewaukee	Waukesha
Pigeon	Waupaca
Pine	Waukesha
Poygan	Winnebago, Waushara
Rock	Jefferson
Rome Pond	Jefferson, Waukesha
Round	Waupaca
Shawano	Shawano

LAKE NAME	COUNTY
Sinnissippi	Dodge
Swan	Columbia
Tainter	Dunn
Tichigan	Racine
Townline	Oneida
Trout	Vilas
Wapogassett	Polk
Wausau	Marathon
Willow	Oneida
Winnebago	Winnebago, Fond Du Lac, Calumet
Wisconsin	Columbia
Wissota	Chippewa
Yellow	Burnett


43° 06'
Hoopers Mill
A3
Rock Creek
ROCK
LAKE
X01
Lake Mills
A1
A2
43° 04'
ROCK LAKE
Tributary Sampling Site
Lake Sampling Site
Direct Drainage Area Boundary
0
1/2
1 Mile
Scale
Mud Lake
Wis.
Map Location
88° 56'
88° 54'
43° 02'

ROCK LAKE

STORET NO. 5564

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Rock Lake is in a relatively good trophic condition, and it is concluded the lake is mesotrophic.

B. Rate-Limiting Nutrient:

Algal assay results indicate Rock Lake was phosphorus limited at the time the sample was collected. Lake data indicate Rock Lake may be nitrogen limited at times.

C. Nutrient Controllability:

There are no known point sources contributing nutrients to Rock Lake, and there are no major tributaries.

It is noted that the estimated phosphorus loading rate during the year of sampling was less than that proposed by Vollenweider (in press) as "permissible"; i.e., an oligotrophic rate (see page 13).

II. INTRODUCTION

Rock Lake was included in the National Eutrophication Survey because of the special interest of personnel of the Wisconsin Department of Natural Resources. There are no known point sources of nutrients to the lake, and there are no major tributaries. Survey sampling of Rock Creek was related to impacts on Koshkonong Lake downstream in the Rock River drainage.

Although a natural lake, the water level of Rock Lake was altered considerably by the construction of an outlet dam (10-foot head) in 1865. The drainage basin is quite small, and much of it is wetlands. The primary land use is agricultural--mainly dairying. The City of Lake Mills borders most of the east shore.

Rock Lake is intensively used for recreation, and swimming, boating, and fishing are popular. Game fish present include northern pike, walleye, large- and smallmouth bass, and panfish; carp are also present but, reportedly, not in problem numbers (Poff, et al., 1968).

Much of the shoreline is privately owned, but a city park and a county park permit public access. Boat launching facilities are provided, and commercial facilities provide services.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry*:

1. Surface area: 1,161 acres.
2. Mean depth: 18.4 feet.
3. Maximum depth: 56 feet.
4. Volume: 21,342 acre/feet.
5. Mean hydraulic retention time: 3.6 years.

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area†	Mean flow†
(No major tributaries)		
Minor tributaries & immediate drainage -	12.0 mi^2	8.2 cfs
Totals	12.0 mi^2	8.2 cfs

2. Outlet -

Rock Creek	14.1 mi^2††	8.2 cfs

C. Precipitation†††:

1. Year of sampling: 37.7 inches.
2. Mean annual: 30.2 inches.

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* Dept. of Natural Resources lake survey map (1955).
† Drainage areas are accurate within ±0.5%; mean daily flows are accurate within ±40%; mean monthly flows are accurate within ±35%; and normalized monthly flows are accurate within ±35%.
†† Includes area of lake.
††† See Working Paper No. 1, "Survey Methods".

IV. LAKE WATER QUALITY SUMMARY

Rock Lake was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one station on the lake and from a number of depths (see map, page vi). During each visit, a single depth-integrated (15 feet or near bottom to surface) sample was collected for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was collected for algal assays. The maximum depth sampled was 22 feet.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake was essentially well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

Parameter	Minimum	Mean	Median	Maximum
		FALL VALUES (11/10/72)		
Temperature (Cent.)	7.2	7.2	7.2	7.2
Dissolved oxygen (mg/l)	10.9	10.9	10.9	11.0
Conductivity (μmhos)	380	387	380	400
pH (units)	8.4	8.4	8.4	8.4
Alkalinity (mg/l)	167	173	172	179
Total P (mg/l)	0.012	0.016	0.017	0.018
Dissolved P (mg/l)	0.007	0.008	0.008	0.009
$NO_2 + NO_3$ (mg/l)	0.110	0.110	0.110	0.110
Ammonia (mg/l)	0.100	0.110	0.110	0.120
		ALL VALUES		
Secchi disc (inches)	72	91	94	108

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
06/23/72*		
08/20/72	1. Chroococcus	1,519
	2. Fragilaria	940
	3. Gloeocapsa	452
	4. Dinobryon	145
	5. Scenedesmus	145
	Other genera	361
	Total	3,562
11/10/72	1. Microcystis	1,468
	2. Synedra	304
	3. Dinobryon	282
	4. Melosira	202
	5. Flagellates	58
	Other genera	354
	Total	2,668

* Sample lost in shipment.

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/23/72	01	7.9
08/20/72	01	4.8
11/10/72	01	11.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.007	0.136	0.3
0.006 P	0.013	0.136	3.2
0.012 P	0.019	0.136	4.2
0.024 P	0.031	0.136	4.3
0.060 P	0.067	0.136	4.5
0.060 P + 10.0 N	0.067	10.136	31.3
10.0 N	0.007	10.136	0.8

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Rock Lake was relatively low at the time the sample was collected.

It is noted that there was some loss of nitrogen between sample collection and the beginning of the assay, but this is unlikely to have affected the control yield because the

sample was phosphorus limited. Note the increased yields with increased levels of orthophosphorus (to about 0.020 mg/l) and the lack of significant response to the addition of only nitrogen.

The lake data also indicate phosphorus limitation at the time the sample was collected as well as during the August sampling. The N/P ratio was 28/1 both times. However, in June the ratio was only 5/1, and nitrogen limitation would be expected at that time.

D. Trophic Condition:

Survey data indicate Rock Lake to be in a relatively good trophic condition. Of the 46 Wisconsin lakes studied, 37 had greater mean total phosphorus, 36 had greater mean dissolved phosphorus, and 38 had greater mean inorganic nitrogen. Although 18 of the study lakes had less mean chlorophyll a, only 7 had greater Secchi disc transparency. Some depression of dissolved oxygen with depth was noted during the August Survey sampling.

It is noted that sampling in 1960 by the Department of Natural Resources (Poff, et al., 1968) showed distinctly higher levels of phosphorus and nitrogen than were measured during the Survey; however, the differences may be due to elimination of or changes in nutrient sources in the intervening 12 years.

On the basis of the Survey data, it is concluded that Rock Lake is mesotrophic.

V. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Wisconsin National Guard collected a monthly near-surface grab sample from the outlet site indicated on the map (page vi), except for the high runoff months of April and May when two samples were collected. The other Rock Creek sites were sampled in relation to Koshkonong Lake. Sampling was begun in September, 1972, and was completed in August, 1973.

Through an interagency agreement estimates of the outlet and immediate drainage flows for the year of sampling and a "normalized" or average year were provided by the Wisconsin District Office of the U.S. Geological Survey.

In this report the nutrient loadings were determined for station A-1 by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*.

Nutrient loads for "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S) were determined by using the pounds per square mile per year calculated for station A-1 and multiplying that by the ZZ area in square miles. It is recognized that the phosphorus loads estimated for ZZ in this way are conservative, since a significant but unknown portion of the phosphorus reaching the lake via the immediate drainage would be trapped in the lake and thus would not be included in the load at A-1.

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* See Working Paper No. 1.

In the preliminary version of this report, estimates of septic tank nutrient contributions were included. However, personnel of the Wisconsin Department of Natural Resources advise that the lakeshore area is sewered (Narf, 1974).

A. Waste Sources:

1. Known municipal - None
2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
(No major tributaries)	-	-
b. Minor tributaries & immediate drainage (non-point load) -	310	63.3
c. Known municipal STP's - None	-	-
d. Septic tanks - None known	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	180	36.7
Total	490	100.0

2. Outputs -

Lake outlet - Rock Creek 360

3. Net annual P accumulation - 130 pounds.

* See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load)-		
(No major tributaries)	-	-
b. Minor tributaries & immediate drainage (non-point load)-	15,720	58.4
c. Known municipal STP's - None	-	-
d. Septic tanks - None known	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	11,190	41.6
Total	26,910	100.0

2. Outputs -

Lake outlet - Rock Creek 18,470

3. Net annual N accumulation - 8,440 pounds.

* See Working Paper No. 1.

D. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving waters would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Units	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
lbs/acre/yr	0.4	0.1	23.2	7.3
grams/m^2/yr	0.05	0.01	2.6	0.8

Vollenweider loading rates for phosphorus ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Rock Lake:

"Dangerous" (eutrophic rate)	0.24
"Permissible" (oligotrophic rate)	0.12

VI. LITERATURE REVIEWED

Anonymous, 1972. Wisconsin lakes. Publ. 218-72, Dept. of Natural Resources, Madison.

Lueschow, Lloyd A., 1972. Biology and control of selected aquatic nuisances in recreational waters. Techn. Bull. #57, Dept. of Natural Resources, Madison.

Narf, Richard P., 1974. DNR intra-department memorandum (review of preliminary Rock Lake report). Dept of Natural Resources, Madison.

Stautz, Floyd, Dick Narf, Jerome McKersie, and George Hansel, 1969. Report on an investigation of the pollution in the Upper Rock River drainage basin made during 1967-68. Dept. of Natural Resources, Madison.

Vollenweider, Richard A., (in press). Input-output models. Schweiz. A. Hydrol.

VII. APPENDICES

APPENDIX A

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR WISCONSIN 9/30/74

LAKE CODE 5564 ROCK LAKE

TOTAL DRAINAGE AREA OF LAKE 14.10

NORMALIZED FLOWS

TRIBUTARY	SUB-DRAINAGE AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5564A1	14.10	4.90	6.50	15.00	17.00	9.10	12.00	6.10	4.60	5.70	6.00	7.10	4.80	8.22
5564Z2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 14.10 TOTAL FLOW IN = 0.0
SUM OF SUB-DRAINAGE AREAS = 0.0 TOTAL FLOW OUT = 98.80

NOTE *** NO SITE AT INLET - INFLOWS NOT CALCULATED

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5564A1	9	72	5.40	23	9.20				
	10	72	6.00	22	3.40				
	11	72	5.30	26	2.90				
	12	72	1.80	16	1.60				
	1	73	33.00						
	2	73	42.00	11	50.00				
	3	73	60.00	18	82.00				
	4	73	32.00	6	26.00	26	36.00		
	5	73	39.00	4	49.00	25	30.00		
	6	73	11.00	16	9.80				
	7	73	0.90	1	1.50				
	8	73	0.50	26	0.70				

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/09/30

556401
43 05 00.0 088 55 30.0
ROCK LAKE
55 WISCONSIN

11EPALES 2111202
5 0012 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/23	13 05	0000	19.0	8.6	72	385	8.30	184	0.100	0.070	0.038	0.033
	13 05	0008	19.2	8.8		355	8.40	183	0.100	0.040	0.043	0.027
72/08/20	10 45	0000			94	370	8.45	173	0.080	0.100	0.013	0.007
	10 45	0004	25.7	9.0		370	8.50	174	0.100	0.090	0.010	0.006
	10 45	0015	23.5	7.9		380	8.40	176	0.070	0.080	0.011	0.007
	10 45	0022	20.8	6.2		380	8.30	179	0.090	0.180	0.013	0.007
72/11/10	15 30	0000			108	400	8.40	167	0.110	0.120	0.012	0.008
	15 30	0004	7.2	11.0		380	8.40	172	0.110	0.110	0.017	0.007
	15 30	0015	7.2	10.9		380	8.40	179	0.110	0.100	0.018	0.009

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/23	13 05	0000	7.9J
72/08/20	10 45	0000	4.8J
72/11/10	15 30	0000	11.7J

J VALUE KNOWN TO BE IN ERROR

APPENDIX C

TRIBUTARY DATA

STORET RETRIEVAL DATE 74/10/02

5564A1 LS5564A1
43 05 00.0 088 55 00.0
ROCK CREEK
55 15 WATERLOO
O/ROCK LAKE
HEAD OF CREEK IN LAKESIDE PARK
11ERALFS 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/23	10 10		0.083	1.000	0.135	0.005K	0.034
72/10/22	11 27		0.034	0.860	0.066	0.005K	0.025
72/11/26	16 55		0.061	0.920	0.039	0.005K	0.018
72/12/16	13 50		0.073	0.810	0.063	0.005K	0.017
73/01/23	15 05		0.138	0.860	0.078	0.006	0.010
73/02/11	16 45		0.115	0.750	0.044	0.005K	0.015
73/03/14	09 25		0.160	1.200	0.147	0.005K	
73/04/06	12 15		0.176	1.150	0.054	0.005K	0.015
73/04/26	08 00		0.189	0.980	0.033	0.006	0.030
73/05/04	16 35		0.220	1.150	0.072	0.007	0.025K
73/05/25	13 45		0.230	1.260	0.072	0.005K	0.015
73/06/16	13 20		0.154	1.150	0.062	0.005K	0.020
73/07/01			0.060	1.470	0.084	0.016	0.047
73/08/26	12 58		0.022	0.840	0.078	0.008	0.015

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/10/02

5564A2 LS5564A2
43 05 00.0 082 54 00.0
ROCK CREEK
55 15 WATERLOO
T/ROCK LAKE
LAKE ST XING E EDGE LK MILLS ABOVE STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/23	10 00		0.120	0.850	0.132	0.005K	0.280
72/10/22	11 20		0.240	0.850	0.058	0.280	0.460
72/11/26	17 05		0.260	1.260	0.157	0.015	0.100
72/12/16	13 40		0.280	1.100	0.236	0.012	0.052
73/01/23	15 00		0.240	1.540	0.120	0.018	0.050
73/02/11	16 51		0.130	0.750	0.048	0.012	0.015
73/03/18	09 20		0.168	0.840	0.140	0.005K	0.035
73/04/06	12 04		0.210	1.470	0.060	0.007	
73/04/26	08 15		0.189	1.400	0.049	0.006	0.030
73/05/04	16 20		0.200	1.600	0.079	0.013	0.035
73/05/25	13 25		0.210	1.470	0.058	0.005K	0.030
73/06/16	13 29		0.520	2.000	0.530	0.078	0.210
73/07/01			0.072	1.150	0.058	0.033	0.065
73/08/26	13 03		0.250	1.470	0.168	0.027	0.125

K VALUE KNOWN TO BE LESS
THAN INDICATED

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STORET RETRIEVAL DATE 74/10/02

5564A3 LS5564A3
43 05 30.0 088 53 30.0
ROCK CREEK
55 15 WATERLOO
T/ROCK LAKE
ST HWY 30 XING NE OF LK MILLS RELO STP
11FPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/23	09 45		0.550	2.850	0.520	0.145	0.230
72/10/22	11 15		1.460	2.650	0.650	0.550	0.825
72/11/26	17 15		1.960	4.200	0.840	1.042	1.370
72/12/16	13 30		0.770	8.750	5.300	1.470	1.685
73/01/23	14 55		1.600	3.300	1.470	0.572	0.780
73/02/11	16 57		0.340	1.320	0.350	0.138	0.185
73/03/18	09 15		0.570	0.940	0.147	0.039	0.220
73/04/05	11 55		0.700	2.900	0.630	0.374	0.500
73/04/26	08 23		0.460	2.900	0.240	0.132	0.190
73/05/04	16 25		0.630	2.300	0.180	0.140	0.250
73/05/25	13 35		0.500	2.400	0.378	0.750	0.820
73/06/16	13 35		1.920	3.360	1.325	0.805	1.150
73/07/01			1.180	3.000	0.790	0.760	1.100
73/08/26	13 28		2.000	3.900	2.000	0.930	1.650